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Abstract

LIGHT WATER ENRICHED URANIUM LATTICE EXPERIMENTS

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Light water moderated 10 % enriched uranium fuelled lattices have been investigated with different H/U^{235} ratios. One of the aims of these experiments was to test the results of calculation methods used. For this purpose the measurements were carried out in a wide interval of the H/U^{235} ratio in order to get significant effects.

Fuel elements of the VVR-S type research reactor were used and in most cases triangular lattice patterns applied.

Critical mass values were determined over the range 190 - 775 of the H/U^{235} ratio. This range involves nearly equal lengths of undermoderated and overmoderated regions.

Temperature dependence of reactivity was determined in the interval 10 - 40 ^{o}C, in overmoderated, undermoderated and in a nearly optimum lattice. Temperatures of fuel and moderator were the same. In this temperature interval both positive and negative values of temperature coefficients were found in all the lattices.

Spatial dependence of the reactivity effect of vertical, cylindrical voids - the lengths of which were

identical with that of the fuel elements - was determined in four cores with different lattice pitches. The values of the void to cell volume ratios were kept nearly the same. Positive void effect was reached in a strongly overmoderated lattice.

Thermal neutron distributions were determined in lattices containing central water traps of different diameters. These measurements were carried out both in a strongly undermoderated and in a nearly optimum lattice.

The value of β^{eff}/l was measured using both the Feynmann and the Rossi method in a nearly optimum lattice. The two methods yielded nearly the same results. The value of β^{eff}/l was determined in an overmoderated and an undermoderated lattice by the Rossi method only - which proved to be faster and more accurate.

The results of a simple calculation method were compared with the experimental data. Rather good agreement was found for the two group model when taking into account fission under slowing down and the intracell dependence of the thermal spectrum in the calculation of the thermal utilisation factor.